

PROJECT OVERVIEW

The barrier island plan is authorized by the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA). The purpose of this study is to determine whether the Louisiana barrier shoreline provides significant protection to Louisiana's coastal resources. If the study proves that the barrier shoreline provides these significant benefits, then this study will develop the most cost effective method to maximize those benefits.

The three year barrier island feasibility study is divided into three phases based on geographical location. Phase 1 is located between the Atchafalaya and Mississippi Rivers. Phase 2 encompasses the cheniere plain barrier formations in Vermilion and Cameron Parishes. Phase 3 focuses on the Chandeleur Islands. Phase 1 is the area currently being studied.

The project is structured to reach an implementation plan by starting from a broad descriptive analysis and gradually becoming more site-specific and detailed as the steps proceed. Each resource study or island option plan begins with some type of qualitative assessment and progresses to a more detailed quantitative analysis. For example: Step C will qualitatively focus on the status and trends of resources for the broad study area; whereas, Steps E and F will quantitatively assess and inventory the existing environmental and economic resources respectively. Also, Step I is a general evaluation of the needs and problems in the study area and development of management alternatives. Later, Step L will define the preferred plan criteria and chose a recommended implementation plan from the management alternatives developed in Step I, based on the quantitative assessments made in Steps J and K.

The first report completed for the barrier island feasibility study is Step A, which reviews prior studies, reports, and existing projects that pertain to the study's purpose, scope, and area. Step A also identifies and describes existing and potential barrier island and wetland restoration projects that affect the Phase 1 area. Step A is an overall orientation for the team on the project area. The literature review ensures that the team is

knowledgeable and familiar with the most current literature available on the barrier islands and is using the most up-to-date information throughout the overall study.

Step B is also completed and contains a conceptual and quantitative framework for the barrier island study. The conceptual framework describes the functions and processes affected by barrier islands and the potential impacts on the significant resources in the study area. The significant resources include economic, cultural, recreational, and land-use resources. Step B also contains a review of the available methods for quantitatively predicting the effects of the barrier islands on environmental and economic resources. This information outlines the general study area for the team and describes the methodology that will be used in Step G to forecast physical and hydrological changes.

Step C provides qualitative assessments of the status and trends of the resources in the project area. A general study area map from Step B defines the area influenced by the barrier islands for the purposes of the Step C general resource assessment. These assessments include economic, social, cultural, water, biological, recreational, and land resources. In addition, the climatology, hydrology, and geological processes are analyzed with regard to their status and trends within the study area. Historical land losses are documented, as well as natural and human contributors to barrier island and wetland change. This information is gathered to demonstrate the characteristics of the study area and to show the resources at risk due to the loss of the barrier shoreline. It also orientates the team to the area and ensures the team will consider these resources in later steps.

Step D is a quantitative inventory of the physical parameters that are used to forecast changes in the economic and environmental resources. Step D involves delineating zones of environmental and economic analysis in the general study area described in Step B. The zones are designated using the Hurricane Andrew storm surge as criteria. The physical process parameters (waves, wind, sea level, sediment transport, etc.) and the geomorphic parameters (surficial sediments, topography, bathymetry) are identified, including data sources, type and quality of data, and any inconsistencies or "gaps" in the data. This information will be used as input for the modeling and

forecasting effort in Step G. The results of Step D allow the team to evaluate the proposed modeling effort as outlined in Step B.

Step E provides a quantitative inventory and assessment of existing environmental resource conditions, with an emphasis on those resources considered significant. The team developed the criteria for determining "significant" environmental resources. Wildlife habitats, breeding grounds, and endangered species refuges are among those resources that have been assessed. Step E includes historical habitat/wetland change maps and describes the land loss rates and their associated changes. These data will be used to forecast the impact of the no-action scenario for environmental resources.

Step F is a quantitative inventory and assessment of existing economic resource conditions. This includes all structures, facilities, farmland acreage, and public resources (roads, channels, bridges, etc.) that are susceptible to the consequences of wetland/land loss, shoreline erosion, or hurricane induced flooding. The value of these economic resources and their residual worth will be included in the assessment. Historical damage and losses caused or induced by oil spills, waves, wetland/land loss, and shoreline erosion will also be evaluated. These data will be used to forecast the impact of the no-action scenario on economic resources.

The forecasted trends of physical and hydrological conditions will be discussed in Step G. A 30 year forecast of the present and future physical conditions will be modeled, showing the effects of a no-action scenario. The study will be conducted using the methods described in the Step B report and the data specified in the Step D report. Bathymetry and topography, waves, tides, storm surge, and other factors that affect the economic and environmental resources will be forecasted.

The effects on environmental resource conditions were forecasted in Step H. Projected wetland/land loss were presented for the 30- and 100-year no-action scenarios. This will help estimate, through the modeling results from Step G and projected trends, the total land loss and the effects on the wildlife that will be experienced within the 30-

year period as present conditions proceed. The team amassed information detailing the projected changes in the barrier shoreline and the anticipated effects of those changes on the environmental resources in the area. The team can then use this information as a baseline to compare project alternatives.

In Step I, the team identified the options to be evaluated. The later steps involve the identification and explanation of the preferred alternative(s). Step I identified the problems, needs, and opportunities of the study area and developing strategic options. Options were considered on an island-chain spatial scale. These options included restoring a historical island configuration, establishing a fall back line, no-action alternative, preserving present-island configurations, strategic retreat, and other possible options. A general assessment of engineering, environmental, economic, and social factors regarding strategic option implementation was considered. An array comparing the different options with these factors was formulated. Those options that cannot be implemented because of cost, long-term effects, or other conditions were no longer considered. The remaining options became management alternatives and are analyzed in greater detail in Step J. Step I provided the necessary island size and inlet locations for the modeling study in Step J.

Step J is the assessment of management alternatives. The most important input for Step J is the identification of the specific management alternatives found in the Step I report. Step J includes qualitative and quantitative assessment of the management alternatives. This step includes a more detailed analysis of the effects of the proposed management alternatives on the environmental and economical resources of the area. For example, if a management alternative being investigated in Step J is a 1930 island configuration, then in Step J the increased flood protection potential from hurricanes by virtue of the size increase of the barrier islands will be described. That protection estimate will be an approximate dollar estimate and not a general assessment as was done in Step I. The output for Step J will be a detailed assessment of the effects of the management alternatives on the resources in the area. Resources include environmental, economical, and social. Where possible, the effects on resources will be quantified. The

report should be based on a thirty year projection into the future and compared to the no action scenario.

Step K involved identifying and assessing possible management and engineering techniques for the management alternatives developed in Step I. Step K assessed the engineering techniques that may be used to implement the management alternatives identified in Step I. The long-term impacts will be used to assess the effectiveness of the various engineering and management techniques. This step determined possible use of beach fill, coastal structures, and possible regulatory controls that provide optimal design life and cost effectiveness. Dune crest height and berm and beach slopes were evaluated for limiting wave runup and overtopping. Volumes of beach fill will be calculated after the beach and dune configurations are established. In addition, borrow site identification and assessment were completed. This was used to determine the cost, quantity available, and methodology for using various borrow sites for material if needed. The output for Step K is the general applicability, cost, and impacts of various engineering alternatives.

Step L will be a description of the rationale for selecting a preferred plan. The criteria will be based upon the detailed assessments made in Steps J and K to develop a cost/benefit relationship. Step J will supply the benefits for each management alternative, while Step K details the cost. The selected management alternative and associated engineering and management techniques will be developed to form preliminary plans and cost estimates. Included will be all beach fill and coastal works concepts, sources of material, and cost of maintenance and monitoring.

In Step M, the team will select the preferred plan based on the criteria described in Step L. The team will then describe the methodology for instituting permitting, right-of-way/construction agreements, final engineering design, bidding, construction, mitigation, monitoring and maintenance. The preferred island configuration will be presented with potential structures, beach fill, dune restoration, and protection plans.

Preferred sand sources and the effect of removing the sand will also be detailed. The Step M report will outline time, cost, and regulatory parameters.

Step N is a consolidation of all deliverables into one final report document. This final report will summarize the information provided in all previous documents.

FOREWORD

The purpose of this study is to assess the consequences to the coastal resources in the Phase 1 Study Area if the barrier shoreline is allowed to continue deteriorating. Also, the study team is tasked to develop barrier shoreline alternatives that will protect and enhance coastal resources.

To achieve these goals, the study has completed the following reports:

Phase 1 - Step A	A Review of Pertinent Literature
Phase 1 - Step B	Conceptual and Quantitative System Framework
Phase 1 - Step C	Assessment of Resource Status and Trends
Phase 1 - Step D	Quantitative Inventory and Assessment of Physical Conditions and Parameters
Phase 1 - Step E	Inventory and Assessment of Existing Environmental Resource Conditions
Phase 1 - Step F	Inventory and Assessment of Existing Economic Resource Conditions
Phase 1 - Step G	Forecasted Trends in Physical and Hydrological Conditions
Phase 1 - Step H(i)	Forecasted Trends in Environmental Resource Conditions
Phase 1 - Step H(ii)	Forecasted Trends in Economic Resource Conditions
Phase 1 - Step I	Forecasted Trends in Formulation and Assessment of Strategic Options
Phase 1 - Step K	Identification and Assessment of Management and Engineering Techniques

The Step J Report is an Assessment of strategic options in the Phase 1 Study Area. The management alternatives, defined and qualitatively assessed in Step I, were numerically modeled for wave and hydrological changes compared to no-action. The results were used to evaluate environmental and economic benefits provided for each alternative.

The following team members have contributed to this part of the study:

T. Baker Smith & Son, Inc.

Wm. Clifford Smith, P.E., P.L.S.

Marc J. Rogers, Sr., P.E.

Stephen Smith, J.D.

Stephen Gilbreath, M.S.

Donald W. Davis, Ph.D.

Coastal Engineering and Environmental Consultants, Inc.

Oneil P. Malbrough, Jr., REM

Applied Technology Research Corporation

Lawrence S. McKenzie, III, M.S.

Lorna Guynn

Louisiana State University

Gregory W. Stone, Ph.D.

Joseph N. Suhayda, Ph.D.

Bruce A. Thompson, Ph.D.

University Of New Orleans

Denise J. Reed, Ph.D.

TABLE OF CONTENTS

	Page
Project Overview	i
Foreword	v
List of Tables	ix
List of Figures	xi
1.0 Introduction	1
2.0 Predicting Future Wetland Areas with Project	5
2.1. Methodology	7
2.1.1. Marsh Shoreline Polygons.	7
2.1.2. Modification of the LANDSAT Image	9
2.2. Results	12
3.0. Predicting Future Hydrologic Conditions with Projects	15
3.1. Set-up of the Hydrologic Model	18
3.2. Results	25
3.2.1. Tide Simulations	25
3.2.1.1. No-Action	25
3.2.1.2. Alternatives 1 and 2	26
3.2.2. Salinity Simulations	34
3.2.2.1. No-Action	34
3.2.2.2. Alternative 1	34
3.2.2.3. Alternative 2	44
3.2.3. Hurricane Simulations	44
4.0. Predicting Future Wave Climate with Projects.	55
4.1. No-Action	55
4.2. Alternative 1.....	72
4.3. Alternative 2.....	87
5.0. Environmental Resources	92
5.1. Emergent Habitat to Open Water	92
5.1.1. Derivation of No-Action Land Loss Projections	92
5.1.2. Derivation of Alternative Projections	93
5.1.2.1. Alternative 1	95
5.1.2.2. Alternative 2	101
5.2. Changes in Emergent Habitats	104

5.2.1. Modeled Changes in Water Level	104
5.2.2. Modeled Changes in Salinity	105
5.2.2.1. Salinity Distribution for No-Action	105
5.2.2.2. Alternative 1	106
5.2.2.3. Alternative 2	111
5.3. Changes in Open Water Habitats	116
5.3.1. Alternative 1	116
5.3.1.1. Barrier Islands	116
5.3.1.2. Open Bays	117
5.3.1.3. Salt Marsh	118
5.3.1.4. Brackish Marsh	119
5.3.2. Alternative 2	119
5.3.2.1. Barrier Islands	119
5.3.2.2. Open Bays	120
5.3.2.3. Salt Marsh	121
5.3.2.4. Brackish Marsh	122
5.4. Summary of Environmental Benefits	122
6.0. Economic Resources.	124
6.1. Wetlands and Marsh Losses	127
6.1.1. Commercial Fishery Losses	129
6.1.2. Recreational Losses	133
6.2. Hydrologic Regimes	137
6.3. Flood Damages to Structures	152
6.3.1. Flood Damage Data	152
6.3.2. Flood Damage Estimates	154
6.3.3. Comparing Flood Damage Estimates for Different Project Assumptions	159
6.3.4. Using Flood Damage Estimates for Evaluating Benefits of Barrier Island Project Alternatives	162
6.4. Other Cost Impacts of Barrier Island Projects	165
6.4.1. Oil and Gas Infrastructure	166
6.4.1.1. Barrier Island Pipeline Reburial Costs	166
6.4.1.2. Wetlands Pipeline Reburial Costs	168
6.4.1.3. Oil and Gas Wells and Related Structures	169
6.4.1.4. Oil and Gas Refineries and Processing Plants	171
6.4.2. Highway and Street Maintenance	172
6.4.3. Water Supply	172
6.4.4. Agricultural Crop Flood Damages	173
6.5. Summary of Economic Benefits of Project Alternatives	176
7.0. Conclusions	180
8.0. References	184

LIST OF TABLES

Table 3-1.	Locations for which time series of the simulations are available	16
Table 3-2.	Changes in water level for future projections	27
Table 3-3.	Average maximum flood elevation for the Track 1 hurricane (meters)...	52
Table 3-4.	Average maximum flood elevation for the Track 2 hurricane (meters)...	52
Table 4-1.	Alternative 1 Reduction in Wave Heights	80
Table 5-1.	Approach and Calculations for Loss Prevention Along Bay Shorelines Associated with Alternatives 1 and 2	94
Table 5-2.	Modifications to Emergent Habitats Associated with Construction of Alternatives (ha)	94
Table 5-3.	Alternative 1 Habitat Distribution (hectares).....	95
Table 5-4.	Alternative 2 Habitat Distribution	101
Table 6-1.	Estimated Annual Interior Wetlands Losses under Project Alternatives and No-Action, 30-, and 100-years	128
Table 6-2.	New Barrier Island Ecosystems Created by Project Alternatives	128
Table 6-3.	Present and Annualized Values of Commercial Fishery Losses Due to Wetlands Loss Under No-Action and Project Alternatives (\$millions)..	131
Table 6-4.	Present and Annualized Values of Reductions in Commercial Fishery Losses Attributable to Project Alternatives (\$millions)	131
Table 6-5.	Commercial Fishery Gains from New Barrier Island Salt Marsh Creation by Project Alternative (\$millions)	133
Table 6-6.	Present Value of Recreational Fishery Losses Due to Wetlands Loss Under Project Alternatives (millions).....	135
Table 6-7.	Present and Annualized Values of Reductions in Recreational Losses Attributable to Project Alternatives (\$millions)	136
Table 6-8.	Estimates of Flood Damages to Residential, Commercial, Industrial and Public Structures from the 90.5W Storm	156
Table 6-9.	Estimates of Flood Damages to Residential, Commercial, Industrial and Public Structures from the 91.5W Storm	161
Table 6-10.	Median Flood Damage Under Two Prototype Storms and Project Alternatives (\$millions)	162
Table 6-11.	Comparison of Median Flood Damage Estimates in 100 Years for Project Alternatives (\$millions)	162
Table 6-12.	Comparison of Median Flood Damage Estimates in 30-years for Project Alternatives - Interpolated Estimates from Table 6-8 (\$millions)	164
Table 6-13.	Present Value Comparison of Median Flood Damage Estimates in 30-years for Project Alternatives (\$millions)	165
Table 6-14.	Expected Barrier Island Pipeline Reburial Costs for No-Action Compared to Current Conditions (\$millions).....	167
Table 6-15.	Expected Interior Wetlands Pipeline Reburial Costs for No-Action Compared to Current Conditions (\$millions)	169

Table 6-16.	Interior Wetlands Pipeline Reburial Costs Savings from Project Alternatives (\$millions)	169
Table 6-17.	Expected Well Platform Construction Cost Increases for Anticipated Bayside Wells Under No-Action	170
Table 6-18.	Expected Well Platform Construction Cost Savings for Anticipated Bayside Wells Under Project Alternatives (\$millions)	171
Table 6-19.	Comparison of Median Flood Damage Estimates for Storms Occurring in 100-years for Project Alternatives (\$millions)	177
Table 6-20.	Comparison of Median Flood Damage Estimates for Storms Occurring in 30-years for Project Alternatives (\$millions)	177
Table 6-21.	Present Value Comparison of Median Flood Damage Estimates for Storms Occurring in 30-years for Project Alternatives (\$millions)	178
Table 6-22.	Summary of Non-Storm Cost Savings and Benefits of Project Alternatives 1 and 2 Compared to No-Action (\$millions)	179
Table 7-1.	Summary of Benefits of Alternative 1 and 2 Compared to No-Action...	183

LIST OF FIGURES

Figure 1-1.	Alternative 1	2
Figure 1-2.	Alternative 2	4
Figure 2-1.	Geometry of the Barrier Island Complex	6
Figure 2-2.	Sub-areas Authorized by the CWPPRA Steering Committee	10
Figure 2-3.	Sub-areas and Wave Polygons	11
Figure 2-4.	Projected Coast (30-year, No-Action)	13
Figure 2-5.	Projected Coast (100-year, No-Action)	14
Figure 3-1.	Time Series Locations	17
Figure 3-2.	Topography (Present, Alternative 1).	20
Figure 3-3.	Topography (30-year, Alternative 1)	21
Figure 3-4.	Topography (100-year, Alternative 1)	22
Figure 3-5.	Topography (30-year, Alternative 2)	23
Figure 3-6.	Topography (100-year, Alternative 2)	24
Figure 3-7.	Water Level Elevation vs. Time St. Mary's Point (present)	28
Figure 3-8.	Water Level Elevation vs. Time Caillou Island (present)	29
Figure 3-9.	Water Level Elevation vs. Time St. Mary's Point (30-year)	30
Figure 3-10.	Water Level Elevation vs. Time Caillou Island (30-year)	31
Figure 3-11.	Water Level Elevation vs. Time St. Mary's Point (100-year)	32
Figure 3-12.	Water Level Elevation vs. Time Caillou Island (100-year)	33
Figure 3-13.	Salinity Distribution (w/o Davis Pond, 30-year, No-Action)	36
Figure 3-14.	Salinity Distribution (with Davis Pond, 30-year, No-Action)	37
Figure 3-15.	Salinity Distribution (w/o Davis Pond, 100-year, No-Action)	38
Figure 3-16.	Salinity Distribution (with Davis Pond, 100-year, No-Action)	39
Figure 3-17.	Salinity Difference (w/o David Pond, 30-year, Alternative 1 vs. No-Action)	40
Figure 3-18.	Salinity Difference (w/o Davis Pond, 100-year, Alternative 1 vs. No-Action)	41
Figure 3-19.	Salinity Difference (with Davis Pond, 30-year, Alternative 1 vs. No-Action)	42
Figure 3-20.	Salinity Difference (with Davis Pond, 100-year, Alternative 1 vs. No-Action)	43
Figure 3-21.	Salinity Difference (w/o Davis Pond, 30-year, Alternative 2 vs. No-Action)	45
Figure 3-22.	Salinity Difference (w/o Davis Pond, 100-year, Alternative 2 vs. No-Action)	46
Figure 3-23.	Salinity Difference (with Davis Pond, 30-year, Alternative 2 vs. No-Action)	47
Figure 3-24.	Salinity Difference (with Davis Pond, 100-year, Alternative 2 vs. No-Action)	48
Figure 3-25.	Maximum Water Level Elevation (Present, No-Action, Track 1)	49
Figure 3-26.	Maximum Water Level Elevation (Present, No-Action, Track 2)	50

Figure 3-27.	Average Maximum Flood Elevation for the Track 1 Hurricane	.....53
Figure 3-28.	Average Maximum Flood Elevation for the Track 2 Hurricane	.....54
Figure 4-1.	Base Map of Phase 1 Study Area, Louisiana Barrier Island Study	.....56
Figure 4-2.	Simulated Wave Height for the Present Scenario during Fair Weather Wave Condition - Area 1	.....57
Figure 4-3.	Predicted Wave Height for the 30-year Projection during Fair Weather Wave Condition - Area 1	.....58
Figure 4-4.	Predicted Wave Height for the 100-year Projection during Fair Weather Wave Condition - Area 1	.....59
Figure 4-5.	Simulated Wave Height for the Present Scenario during Fair Weather Wave Condition - Area 2	.....60
Figure 4-6.	Predicted Wave Height for the 30-year Projection during Fair Weather Wave Condition - Area 2	.....61
Figure 4-7.	Predicted Wave Height for the 100-year Projection during Fair Weather Wave Condition - Area 2	.....62
Figure 4-8.	Simulated Wave Height for the Present Scenario during Fair Weather Wave Condition - Area 3	.....63
Figure 4-9.	Predicted Wave Height for the 30-year Projection during Fair Weather Wave Condition - Area 3	.....64
Figure 4-10.	Predicted Wave Height for the 100-year Projection during Fair Weather Wave Condition - Area 3	.....65
Figure 4-11.	Predicted Change in Wave Height for the 30-year Projection in the event of Barrier Island Erosion for Fair Weather Wave Conditions - Area 1....	66
Figure 4-12.	Predicted Change in Wave Height for the 100-year Projection in the event of Barrier Island Erosion for Fair Weather Wave Conditions - Area 1....	67
Figure 4-13.	Predicted Change in Wave Height for the 30-year Projection in the event of Barrier Island Erosion for Fair Weather Wave Conditions - Area 2....	68
Figure 4-14.	Predicted Change in Wave Height for the 100-year Projection in the event of Barrier Island Erosion for Fair Weather Wave Conditions - Area 2....	69
Figure 4-15.	Predicted Change in Wave Height for the 30-year Projection in the event of Barrier Island Erosion for Fair Weather Wave Conditions - Area 3....	70
Figure 4-16.	Predicted Change in Wave Height for the 100-year Projection in the event of Barrier Island Erosion for Fair Weather Wave Conditions - Area 3....	71
Figure 4-17.	Wave Heights for Alternative 1 Scenario during Fair Weather Conditions	.....74
Figure 4-18.	Index Map for 30-year No-Action and Alternative 1	.....75
Figure 4-19.	Index Map for 100-year No-Action and Alternative 1	.....76
Figure 4-20.	Typical Wave Absorber Section and Profile (units in meters)	.....77
Figure 4-21.	Alternative 1 Wave Simulation - 6km Fetch	.....78
Figure 4-22.	Alternative 1 Wave Simulation - 13km Fetch	.....79
Figure 4-23.	Simulated Wave Heights during Fair Weather Conditions for Alternative 1 and 30-year Scenario (Location 1)	.....81
Figure 4-24.	Simulated Wave Heights during Fair Weather Conditions for Alternative 1 and 100-year Scenario (Location 1)	.....82
Figure 4-25.	Simulated Wave Heights during Fair Weather Conditions for Alternative 1 and 30-year Scenario (Location 3)	.....83

Figure 4-26.	Simulated Wave Heights during Fair Weather Conditions for Alternative 1 and 100-year Scenario (Location 3)	84
Figure 4-27.	Simulated Wave Heights during Fair Weather Conditions for Alternative 1 and 30-year Scenario (Location 8)	85
Figure 4-28.	Simulated Wave Heights during Fair Weather Conditions for Alternative 1 and 100-year Scenario (Location 8)	86
Figure 4-29.	Predicted Wave Height for Alternative 2 in Configuration during Fair Weather Wave Conditions - Area 1	89
Figure 4-30.	Predicted Wave Height for Alternative 2 in Configuration during Fair Weather Wave Conditions - Area 2	90
Figure 4-31.	Predicted Wave Height for Alternative 2 in Configuration during Fair Weather Wave Conditions - Area 3	91
Figure 5-1.	Projected Coastal Habitat (30-year, No-Action)	96
Figure 5-2.	Projected Coastal Habitat (100-year, No-Action)	97
Figure 5-3.	Projected Coastal Habitat (30-year, Alternative 1)	98
Figure 5-4.	Projected Coastal Habitat (100-year, Alternative 1)	99
Figure 5-5.	Projected Coastal Habitat (30-year, Alternative 2)	102
Figure 5-6.	Projected Coastal Habitat (100-year, Alternative 2)	103
Figure 5-7.	Salinity Distribution (with Davis Pond, 30-year, Alternative 1)	108
Figure 5-8.	Salinity Distribution (with Davis Pond, 100-year, Alternative 1)	109
Figure 5-9.	Salinity Distribution (w/o Davis Pond, 100-year, Alternative 1)	110
Figure 5-10.	Salinity Distribution (with Davis Pond, 30-year, Alternative 2)	113
Figure 5-11.	Salinity Distribution (with David Pond, 100-year, Alternative 2)	114
Figure 5-12.	Salinity Distribution (w/o Davis Pond, 100-year, Alternative 2)	115
Figure 6-1.	The Eleven Parish Study Area	126
Figure 6-2.	Tidal Surge Flood Depths Under Current Barrier Shoreline with 90.5W Storm	140
Figure 6-3.	Zoom of Tidal Surge Flood Depths Under Current Barrier Shoreline with 90.5W Storm Showing Terrebonne and Lafourche Parish Census Tracts	141
Figure 6-4.	Increases in Flood Depth in 100-Years Under No-Action Compared to Current Flood Depths for 90.5W Storm, Showing Terrebonne and Lafourche Parish Census Tracts	143
Figure 6-5.	Increases in Flood Depth in 100-Years Under No-Action Compared to Current Flood Depths for 91.5W Storm	144
Figure 6-6.	Increases in Flood Depth of 90.5W Storm in 100-Years Under No-Action, Compared to Alternative 1	146
Figure 6-7.	Increases in Flood Depth of 90.5W Storm in 100-Years Under No-Action, Compared to Alternative 2	147
Figure 6-8.	Increases in Flood Depth of 91.5W Storm in 100-Years Under No-Action, Compared to Alternative 1	148
Figure 6-9.	Increases in Flood Depth of 91.5W Storm in 100-Years Under No- Action, Compared to Alternative 2	149
Figure 6-10.	Areas Newly Flooded by 90.5W Storm in 100-Years Under No-Action, But Not Currently Flooded in 90.5W Storm	150

Figure 6-11.	Areas Newly Flooded by 91.5W Storm in 100-Years Under No-Action, But Not Currently Flooded in 91.5W Storm	151
Figure 6-12.	Zoomed View of Flood Depths from 90.5W Storm in 100-Years for Terrebonne Parish Under Alternative 2	158
Figure 6-13.	Streets Likely to be Newly Flooded by 90.5W or 91.5W Storm Under No-Action, But Not Flooded Under Current Storm	174
Figure 6-14.	Agricultural Areas Likely to be Newly Flooded by 90.5W or 91.5W Storm Under No-Action, But Not Flooded Under Current Storm	175